Restoring Special Interest Flora to Susquehanna Tributaries

The theory of the problem: Water-willow (*Decodon verticillatus*) is listed as uncommon, with some cause for long-term concern due to declines or other factors, according to the Pennsylvania Natural Heritage Program (PNHP). This plant community serves as a buffer against sediment and pollution runoff from developed lands adjacent to rivers, streams, and wetlands by slowing the flow of surficial water, causing sediment to settle rather than reach the waterbody. Also, it is anecdotally known to provide multipurpose habitat for all stages of development for the smallmouth bass, and wading birds are often seen foraging and frequenting stands of the water-willow. Without abundant flora like the water-willow within and adjacent to the Susquehanna River and its tributaries, runoff and sediment from erosion flow into the waterways and pollute the water, eventually reaching the Chesapeake Bay. Elevated levels of pollutants cost municipalities significant sums of money to treat and to pay for fines given by the PA Department of Environmental Protection (DEP) and Environmental Protection Agency (EPA) for not meeting the requirements of a municipality's Total Maximum Daily Load (TMDL) and/or Municipal Separate Storm Sewer System (MS4) Permit. In addition, habitat for native wildlife is also reduced or impaired.

The theory of change: To restore water-willow and other flora species of special interest to the Susquehanna River watershed to protect water quality, a source of plant materials is needed. Currently, there are few options for obtaining significant quantities of native plant material, especially for aquatic and emergent plant species. In addition, while it is known that plants like water-willow are beneficial to the environment, their benefits have not been quantitatively assessed in a formal manner. Without that data, getting buy-in for the cost of restoration projects will be more difficult, as people may question the return on investment (ROI) of such an idea. These two needs will have to be met to successfully initiative a large-scale restoration initiative. Messiah College faculty and students, already performing some studies on plants and ecosystems like the water-willow's, could take on the task of quantitatively and qualitatively assessing the benefits of such plants. This data could then be incorporated into restoration plans for specific tributaries of the Susquehanna River. Then a native plant nursery like Octoraro could begin propagating water-willow and other relevant flora to begin restoration work across the watershed. RiverStewards will coordinate logistics between the collaborators.

The theory of action: The collaborators will work together to ensure enough quantitative and qualitative data is generated to show the water quality benefits of water-willow and similar species. This data will be shared with municipalities, DEP, and other interested parties to provide justification for the creation of flora restoration plans for the various tributaries to the Susquehanna River. Then, based upon the demand for the various plant species, Octoraro Native Plant Nursery will begin propagating quantities of the flora to be sold wholesale to municipalities (and others) for their restoration projects. These projects, once completed, will count as a best management practice (BMP) for the municipalities to meet some of the regulatory requirements of their TMDL and/or MS4 permits, thus saving them money in the long-run. Based on the success of the initial few restoration projects, RiverStewards will expand the project to other tributaries to the Susquehanna River, as well as other waterbodies in the state.